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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,841	03/19/2004	Lawrence E. Gebhart	461987-024	7527

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EXAMINER

LEADER, WILLIAM T

ART UNIT	PAPER NUMBER
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1742

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/804,841

Applicant(s)

GEBHART ET AL.

Examiner

William T. Leader

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 41-43 and 120 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-40 and 44-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/26/04; 2/2/2005</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's election without traverse of Group II, claims 21-40 and 44-46 in the reply filed on December 19, 2006 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 21, 22, 26, 32, 33 and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Bonkass et al (6,974,530).

4. Based on the definition in dictionary.com,, the term ejector is taken to mean "ejector" which is defined as a person or thing that ejects. The term dampen is defines as to restrain. The Bonkass et al patent is directed to a method of controlling ion distribution during plating onto a workpiece, particularly plating copper onto integrated circuits on a large diameter wafer. Efforts are being made in the field to provide the copper layer as uniformly as possible. See the abstract and column 1, lines 20-44. Typical apparatus used to carry out the plating is illustrated in figure 1a and 1b. The apparatus includes plating vessel 101 and workpiece 109, such as a semiconductor wafer, which is shown as being connected to power source 110 as the cathode, and anode 102. The vessel includes inlet 105 from which plating solution is ejected as shown

by the arrows in figure 1a. This inlet is considered to fall within the dictionary definition of eductor. Diffuser element 111 is provided between the anode and the substrate holder and is considered to be a dampening member since it restrains the flow of plating solution. All elements recited in the preamble of instant claim 21 are taught by Bonkass et al. As shown by the arrows in figure 1a, the electrolyte solution flows over the dampening member after being injected at the bottom of the vessel. An electric current is caused to flow by power source 110. See column 1, line 47 to column 2, line 3. Thus, the process steps recited in claim 21 are taught by Bonkass et al.

5. With respect to claim 22, the workpiece may be a wafer (column 1, lines 59-60). With respect to claim 26, the metal plated may be copper (column 1, line 20). With respect to claim 32 the diffuser of Bonkass et al may be considered to be a shaped guide. With respect to claims 33 and 35, the diffuser has a curved side surface and a flat top surface.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bonkass et al (6,974,530) in view of Wang et al (6,610,89).

9. The Wang et al patent is directed to electroplating a workpiece such as a semiconductor workpiece. Wang teaches that the substrate may be vibrated vertically or horizontally relative to the electrolyte solution to enhance fluid flow of the electrolyte solution into the features contained on the plating surfaces. See column 13, lines 60-66. The prior art of record is indicative of the level of skill of one of ordinary skill in the art. It would have been obvious at the time the invention was made to have vibrated the workpiece of Bonkass et al as taught by Wang et al because electrolyte solution would have better contacted the features of the workpiece.

10. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonkass et al (6,974,530) in view of the admitted prior art.

11. The admitted prior art is that found under the heading "Background of the Invention" and shows that it is known to move the workpiece left to right to improve the uniformity of flow

(paragraph.[0015]). This movement is considered to be oscillatory. It would have been obvious at the time the invention was made to have included an oscillator in the apparatus used to carry out the process of Bonkass et al because uniformity of flow would have been improved as taught by the admitted prior art.

12. Claims 27-31, 34, 38-40 and 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonkass et al (6,974,530) in view of Wilson et al (2005/0178667)

13. Claims 27-31 relate to anode - workpiece spacing and the size of the workpiece. Bonkass et al refers to plating large diameter wafers but does not give a specific size (column 1, lines 31-32). Wilson et al is directed to electroplating onto semiconductor wafers and discloses that the wafer may be 300 mm in diameter. It would have been obvious to have plated a 300mm wafer in the process of Bonkass et al because the process is disclosed as being suitable for large diameter wafers and Wilson shows that one size of large diameter wafer is 300mm. Distance between the anode and workpiece is a result-effective variable which relates to the electric current reaching the workpiece. Choice of the distance based on the size of the workpiece and geometry of the plating cell would have a matter of routine optimization within the skill of the ordinary worker in the art. The radius of curvature recited in claim 34 would have been obvious because Bonkass et al shows the diffuser element as being similar in size to the wafer being plated and Wilson teaches a wafer having approximately a 12 inch diameter. As shown in figure 4, the apparatus of Wilson includes a baffle or shield over the anode elements. With respect to claims 44-46, both Bonkass et al and Wilson et al disclose the desirability of uniform plating. In paragraph [0073] Wilson et al teaches reducing non-uniformity to less than five percent of the 3-sigma value.

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14. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonkass et al (6,974,530) in view of the Lowenheim text Electroplating.


15. Lowenheim teaches that anode may be placed in anode bags of finely woven material to hold back anode sludges. See page 153. It would have been obvious to have utilized an anode bag in the process of Bonkass et al to have reduced the contamination of the electrolyte solution with anode sludge as taught by Lowenheim.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to William T. Leader whose telephone number is 571-272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


William Leader
March 15, 2007


NOT RECORDED
PATENT EXAMINER
MARCH 17 2007